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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/658,928	09/11/2000	Shinichiro Kotake	080542/0153	4017

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EXAMINER	
VANOY, TIMOTHY C	

ART UNIT	PAPER NUMBER
1754	8

DATE MAILED: 08/01/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.	Applicant(s)
09/658,928	KOTAKE et al.
Examiner	**Group Art Unit**
VANOY	1754

—The MAILING DATE of this communication appears on th cover sheet beneath th correspondence address—

P riod for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE THREE MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

☒ Responsive to ~~communication(s) filed on~~ THE AMENDMENT DATE-STAMPED JULY 8 2003.

☐ This action is **FINAL.**

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle,* 1935 C.D. 1 1; 453 O.G. 213.

Disposition of Claims

☒ Claim(s) 9-17 AND 19-30 is/are pending in the application.

Of the above claim(s) _____ is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 9-17 AND 19-30 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claim(s) _____ are subject to restriction or election requirement

Application Papers

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☒ ~~The drawing(s)~~ FIGURES 9 AND 10 filed on SEPT 11, 00 ~~is~~/are objected to by the Examiner

☒ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Pri rity under 35 U.S.C. § 119 (a)-(d)

☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119 (a)-(d).

☒ All ☐ Some* ☐ None of the:

☐ Certified copies of the priority documents have been received.

☒ Certified copies of the priority documents have been received in Application No. 09-058,965.

☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a))

*Certified copies not received: _____.

Atta hment(s)

☐ Information Disclosure Stat m nt(s), PTO-1449, Paper No(s). _____

☒ Notice of Ref rence(s) Cited, PTO-892

☐ Notice of Draftsperson's Pat nt Drawing Revi w, PTO-948

☐ Int rvi w Summary, PTO-413

☐ Notice of Informal Pat nt Application, PTO-152

☐ Other _____

Office Action Summary

DETAILED ACTION

Priority

Acknowledgment is made of the applicants' claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. 09-058,965, filed on Apr. 13, 1998.

Drawings

a) The brief description of figures 9 and 10 on pg. 18 in the applicants' specification indicates that the subject matter illustrated in figures 9 and 10 is prior art. If figures 9 and 10 are prior art, then they should be so labeled. Labeling a figure "related art" is not the same as labeling it "prior art".

Specification

a) The use of brackets in the abstract is objected to because they may confuse the printer about whether or not the disclosure within the brackets should be deleted or not. Brackets are normally used to indicate subject matter that should be deleted.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

The person having "ordinary skill in the art" has the capability of understanding the scientific and engineering principles applicable to the claimed invention. The references of record in this application reasonably reflect this level of skill.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 9-12, 14-17 and 20-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over the prior art process described on pgs. 1-5 in the applicants' specification and illustrated in applicants' figure 9 in view of U. S. Pat. 5,024,171 and pgs. 367-371 in the Gas Purification book by Kohl et al.

The prior art process described on pgs. 1-5 in the applicants' specification and illustrated in applicants' figure 9 describes a process for removing NO_x and SO_2 out of a flue gas contaminated with NO_x, SO_2 and SO_3, comprising:

subjecting the flue gas to denitrification step with injected ammonia (B) in denitrifier (2) to produce a flue gas containing a diminished amount of nitrogen oxides and as little as 5 ppm residual ammonia;

passing the flue gas through an electrostatic precipitator (ESP) (5);

passing the flue gas through a heat exchanger (7), which extracts heat from the flue gas;

passing the flue gas through a desulfurization tower (8), where the sulfur dioxide within the flue gas is scrubbed with a limestone slurry to produce a gypsum-containing scrubbing solution and a flue gas having a diminished concentration of sulfur dioxide;

passing the flue gas through another heat exchanger (9), which heats the flue gas;

passing the flue gas through a fan (11), which imparts sufficient motive force to help push the purified flue gas through discharge stack (13) and into the atmosphere, in a manner fairly suggesting the limitations of at least applicants' claims 9, 12, 14, 20, 24 and 27.

The difference between the applicants' claims and the prior art process described in the applicants' specification is that applicants' claims 9, 10, 15, 16, 17, 23 and 25 call for injecting even more ammonia into the flue gas so that there is a greater excess of ammonia in the flue gas over and above the 5 ppm mentioned in the applicants'

description of the prior art (for example, applicants' claim 10 sets forth that the concentration of ammonia in the flue gas is not less than 30 ppm).

U. S. Pat. 5,024,171 describes a similar process for removing contaminants out of flue gas emitted from the combustion of fuels, wherein col. 1 lns. 38-40 reports that undesirable sulfuric acid emissions (resulting from the presence of SO_3 in the flue gas: please also see col. 1 lns. 27-28) can be reduced by injecting ammonia into the flue gas, and col. 1 lns. 50-54 reports that if too little ammonia is injected into the flue gas the sulfur trioxide will react with the ammonia to form ammonium bisulfate, which forms a sticky liquid mass inside the ducts or equipment, rather than ammonium sulfate.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made *to modify* the prior art process described in the applicants' specification *by increasing* the amount of residual ammonia present in the flue gas exiting the denitrification unit, in the manner set forth in the limitations of applicants' claims 9, 10, 15, 16, 17, 23 and 25, *because* of the expected advantage of the excess residual ammonia to react with and remove the sulfur trioxide present in the prior art's flue gas (please refer to pg. 2 lns. 13-15 in the applicants' specification) in such amounts sufficient so as to produce the desired ammonium sulfate, rather than the undesired ammonium bisulfate, which is taught to plague the process by plating out on the surface of equipment and is attributed to too little ammonia in the gas (please see col. 1 lns. 50-54 in U. S. Pat. 5,024,171: which would appear to be the case for the prior art process described on pg. 2 lns. 1-2 in the applicants' specification).

Also, note that as a consequence of forming the desired ammonium sulfate set forth in col. 1 lns. 50-54 in U. S. Pat. 5,024,171, U. S. Pat. 5,024,171 in col. 6 lns. 22-24 also discloses that the ammonium sulfate powder may be removed with an electrostatic precipitator - in a manner rendering obvious the limitations of applicants' claims 21 and 22.

It is also submitted to have been obvious for one of ordinary skill in the art to measure and report the extent to which the gas has been denitrified in the prior art process modified by the manner set forth in U. S. Pat. 5,024,171, in the manner set forth in applicants' claim 11, as evinced by the disclosure set forth on pg. 4 lns. 18-20 in the applicants' specification. Similarly, it is also submitted to have been obvious to one of ordinary skill in the art at the time the invention was made to measure and report the extent to which the gas has been desulfurized in the prior art process modified by the manner set forth in U. S. Pat. 5,024,171, in the manner set forth in applicants' claim 26, as evinced by the disclosure set forth on pg. 4 lns. 20-21 in the applicants' specification.

The step of spraying a liquid that is relatively acidic into the flue gas that exits a desulfurization step that used ammonia to remove the sulfur dioxide which has been introduced into the bottom of claim 1 via the amendment date-stamped July 8, 2003, is noted, but is conventional (and, therefore, obvious) in view of the disclosure set forth at the top of pg. 371 in the Gas Purification book by Kohl et al., where it is taught that gases exiting a scrubber (i. e. a scrubber that uses ammonia to remove sulfur dioxide: please also see reaction (7-63) on pg. 367 in the Gas Purification book, for example) is

scrubbed with slightly acidic water to react with and remove the ammonia out of the scrubbed gas so that an "ammonia-free" gas may be discharged into the atmosphere.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made *to modify* the prior art process described on pgs. 1-5 in the applicants' specification *by washing* the scrubbed gas exiting the desulfurization step with acidic liquid, in the manner set forth at the bottom of applicants' claim 1 and also disclosed at the top of pg. 371 in the Gas Purification book by Kohl et al., *because* the top of pg. 371 in the Gas Purification book discloses that such a step prevents unwanted ammonia from being discharged into the atmosphere along with the cleaned gas.

Claims 9-12, 14-17 and 19-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over the prior art process described on pgs. 1-5 in the applicants' specification and illustrated in applicants' figure 9 in view of U. S. Pat. 5,024,171 and pgs. 367-371 in the Gas Purification book by Kohl et al., as applied to claims 9-12, 14-17 and 20-27 above, and further in view of the English translation of DE G93 19 017.4 U1 (hence "DE-017").

The difference between the applicants' claims and the prior art process is that applicants' claim 19 call for spraying the flue gas with a liquid at a location downstream of the desulfurization unit, and applicants' claims 28-30 set forth that the absorption tower, the reheating section and the fan comprise a stack (i. e. the exhaust stack

comprises an absorption tower, a reheating section and a fan (please see applicants' fig. 1)?).

DE G93 19 017.4 U1 is drawn to the same art of cleaning the exhaust gas emitted from power plants, etc., however the process of DE G93 19 017.4 uses an exhaust gas stack that is equipped with a fan (15), a gas desulfurization unit (4) and then a gas reheating section (23) (please see fig. 1 and the description of the features illustrated in figure 1 on pgs. 12 and 13 in the English translation of DE G93 19 017.4 U1). The middle of pg. 4 in the English translation of DE G93 19 017.4 U1 explains that the advantage of housing the flue gas desulfurization system (etc.) within the chimney is that the amount of space required by the apparatus is reduced (in a manner rendering obvious the limitations of at least applicants' claims 29 and 30 in as much as the prior art chimney is described as having dimensions of 150 x 38 meters in the paragraph bridging pgs. 4 and 5 in the applicants' specification) and material costs are reduced.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made *to modify* the process resulting from the combination of the prior art process described in the applicants' specification in view of U. S. Pat. 5,024,171 *by inserting* the desulfurization unit (8), gas reheating unit (9) and fan (11) literally *within* the chimney structure (13) illustrated in the prior art process in applicants' figure 9, in the manner set forth in applicants' claims 19 and 28-30, *because* of the taught advantage of such an arrangement as saving space and material costs, as set forth in the middle of pg. 4 in the English translation of DE G93 19 017.4 U1.

Claims 1-17 and 19-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicants' description of the prior art process set forth on pgs. 1-5 in the applicants' specification and illustrated in applicants' fig. 9 in view of U. S. Pat. 5,024,171, pgs. 367-371 in the Gas Purification book by Kohl et al. and the English translation of DE G93 19 017.4 U1 as applied to claims 1-12, 14-17 and 19-30 above, and further in view of pgs. 9-50, 9-51 and 11-3 to 11-8 in the Chemical Engineers' Handbook (5^{th} ed.) edited by Perry et al.

The difference between the prior art process described in the applicants' specification and the applicants' claims is that applicants' claim 13 sets forth the process uses a non-leaking shell and tube type heat exchanger (whereas the prior art process uses a Ljungstrom-type heat exchanger: please see pg. 2 lns. 6 and 7 in the applicants' specification).

Pg. 9-50 in the Chemical Engineers' Handbook discloses that Ljungstrom-type heaters suffer from leakage, and pg. 11-3 in the Chemical Engineers' Handbook discloses that shell and tube-type heat exchangers constitute the bulk of unfired heat transfer equipment in chemical process plants (please see the 1^{st} sentence).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made *to modify* the prior art process described on pgs. 1-5 in the applicants' specification *by substituting* the shell and tube-type heat exchangers mentioned on pg. 11-3 in the Chemical Engineers' Handbook *in lieu of* the Ljungstrom-type heat exchanger mentioned on pg. 2 lns. 6 and 7 in the applicants' specification, in the manner set forth in applicants' claim 13, *because* of the expected advantage of

avoiding the leakage problems associated with Ljungstrom-type heaters, as taught on pg. 9-50 in the Chemical Engineers' Handbook, by using the shell and tube-type heat exchanger.

Response to Arguments

The Applicant's arguments submitted in their amendment date-stamped July 8, 2003 (paper no. 7) have been fully considered but they are not persuasive.

a) *In the amendment date-stamped July 8, 2003, the applicants request that the conventional systems illustrated in figures 9 and 10 may or not be prior art depending on when or where they were used and disclosed. Therefore, it is requested that these figures be allowed to retain their "related art" labels.*

The request is denied because it is not accompanied with a showing in the MPEP (or any other authority) that figures should be labeled "related art". The applicants' request raises the question: are figures 9 and 10 prior art to this application and its parent applications? If figures 9 and 10 are prior art to this application, then these figures should be so labeled.

b) The applicants argue that a web search showed that 2,184 patents have issued with at least one bracket in the abstract – thereby indicating that the printers are capable of printing abstracts with brackets. As of the end of July 2003, the PTO will no longer be using brackets to amend the specification (or the PTO will be using double brackets). Therefore, there should be no confusion when the abstract is ready for printing.

The objection is maintained, and the substitution of commas in lieu of the current brackets is suggested to overcome this objection. The argument is not accompanied with a copy of the argued web search or a single patent with an exemplary abstract. The amendment date-stamped July 8, 2003 pre-dates a date that is "the end of July 2003".

c) *The applicants argue that none of the references of record teach or suggest that the flue gas should be sprayed with a liquid having a higher acidity than the absorbing fluid at a location downstream of the desulfurization step.*

The step of spraying a liquid that is relatively acidic into the flue gas that exits a desulfurization step that used ammonia to remove the sulfur dioxide which has been introduced into the bottom of claim 1 via the amendment date-stamped July 8, 2003, is noted, but is conventional (and, therefore, obvious) in view of the disclosure set forth at the top of pg. 371 in the Gas Purification book by Kohl et al., where it is taught that gases exiting a scrubber (i. e. a scrubber that uses ammonia to remove sulfur dioxide: please also see reaction (7-63) on pg. 367 in the Gas Purification book, for example) is scrubbed with slightly acidic water to react with and remove the ammonia out of the scrubbed gas so that an "ammonia-free" gas may be discharged into the atmosphere.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made *to modify* the prior art process described on pgs. 1-5 in the applicants' specification *by washing* the scrubbed gas exiting the desulfurization step with acidic liquid, in the manner set forth at the bottom of applicants' claim 1 and also disclosed at the top of pg. 371 in the Gas Purification book by Kohl et al., *because* the

top of pg. 371 in the Gas Purification book discloses that such a step prevents unwanted ammonia from being discharged into the atmosphere along with the cleaned gas.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy C. Vanoy whose telephone number is 703-308-2540. The examiner can normally be reached on 8 hr. days.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman, can be reached on 703-308-3837. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Timothy Vanoy

Timothy Vanoy/tv
July 29, 2003

Timothy Vanoy
Patent Examiner

Art Unit 1754